

NDACC Measurements Protocol

Introduction

The international Network for the Detection of Atmospheric Composition Change (NDACC), formerly the Network for the Detection of Stratospheric Change (NDSC), was formed to provide a consistent, standardized set of long-term measurements of atmospheric trace gases, particles, and physical parameters via a suite of globally distributed research and observation sites. Officially operational since 1991, NDSC was established during the late 1980s in response to the need to document and understand worldwide stratospheric perturbations resulting from increased anthropogenic emissions into the atmosphere of long-lived halogenated source gases with strong ozone-depleting and global-warming potentials.

The initial objective of the NDSC was to make observations through which changes in the physical and chemical state of the stratosphere could be determined and understood. While the network remains committed to monitoring changes in the stratosphere, with an emphasis on the long-term evolution of the ozone layer (i.e., its decay, likely stabilization, and expected recovery), its priorities have broadened considerably to encompass

- detecting trends in overall atmospheric composition and understanding their impacts on the stratosphere and troposphere,
- studying atmospheric composition variability at interannual and longer timescales,
- establishing links and feedbacks between climate change and atmospheric composition,
- calibrating and validating space-based measurements of the atmosphere,
- supporting process-focused scientific field campaigns, and
- testing and improving theoretical models of the atmosphere.

Therefore, to better reflect the free tropospheric and stratospheric coverage of the Network's measurement, analysis, and modeling activities, as well as to convey the linkage to climate change, the name was officially changed in 2007 to the Network for the Detection of Atmospheric Composition Change (NDACC).

Because of its worldwide dimension, the Network has been recognized as a major component of the international atmospheric research effort. As such, it has been endorsed by national and international scientific agencies, including the United Nations Environmental Programme (UNEP) and the International Ozone Commission (IO3C) of the International Association of Meteorology and Atmospheric Physics (IAMAP). It also has been recognized by the World Meteorological Organization (WMO) as a major contributor to WMO's Global Atmosphere Watch (GAW).

NDACC's dual objective of observation and understanding requires high-precision, state-of-the-art measurements. Hence, instrument development and

testing are high-priority Network activities to insure operational continuity and success at the current suite of stations, which are organized into six latitudinal zones. Details on instrumentation and deployment priorities and a current list of measurement activities at the various stations can be found on the NDACC web site <<http://www.ndacc.org/>>. As the originally formulated NDSC arose from the interest and involvement of scientists within the international stratospheric research community, the long-term success of the broadened NDACC depends on the continued involvement of and expansion within the broader atmospheric science community.

NDACC recognizes the limitations of ground-based measurements for achieving a global representation of the atmosphere. Thus, the comparison of NDACC instruments with others is essential not only to improve scientific understanding, but also to broaden the geographical base of such measurements in a certifiable way. In order to improve and foster investigations of mutual scientific interest and Network benefit, a protocol has been developed for adding measurement activities within NDACC.

Principal Investigators (PIs) interested in having their measurement activities formally affiliated with the NDACC should identify a specific benefit to NDACC resulting from geographical location, measurement technique, or added science value (such as the measurement of additional molecules or parameters). Measurements may include either long-term or campaign-style observations. In the case of long-term measurements, commitment must be of sufficient length to allow for adequate trend determination or geophysical analysis. Since NDACC is dedicated to the pursuit of measurements of the highest quality, it is necessary for all measurements seeking NDACC affiliation to meet similar standards. Thus, the candidate PI must provide information on the details of the measurement, a record of measurement and analysis intercomparison activities, and a description of quality control procedures that have been implemented. In addition, the specific benefit of the measurement to NDACC goals and objectives should be described, and the NDACC Data Protocol adopted.

It frequently is beneficial for the candidate PI to contact one of the NDACC Steering Committee Co-Chairs prior to the submission of a formal application in order to facilitate collaboration with one or more appropriate Working Groups. Such collaboration can be of great value in developing the application and in initiating the validation process.

Definitions

An NDACC Station is a measurement location that hosts one or more NDACC-affiliated instruments. Inherent to this approval is a commitment by the sponsoring institution(s) for operations support covering the measurement period proposed.

An NDACC PI is a scientist who

- i. measures one or more atmospheric molecules or parameters of interest to NDACC (either at a new or an existing NDACC station),
- ii. has submitted a written statement of interest in pursuing an active collaboration with NDACC,
- iii. has been selected by the NDACC Steering Committee for PI status following the evaluation procedure described below, and
- iv. has secured the necessary resources from the PI's own institution or from a specific funding agency for conducting the measurements and analyzing the data.

In cases where the measurements of interest are conducted under the auspices of an existing independent network, it may be more appropriate to pursue the affiliation of that network with NDACC as a 'Cooperating Network.' Details regarding such affiliation can be found in the NDACC Cooperating Network Protocol, which is available on the NDACC web site.

Evaluation Procedure

Measurement scientists wishing to participate in NDACC should provide descriptions of their instruments, measurements, and analysis methods, along with an outline of their proposed interaction, via a brief proposal submitted to the NDACC Steering Committee for assigned evaluation. This evaluation will be conducted as follows:

- 1) In the case where the measurement technique corresponds to one of the NDACC instrument types (Dobson/Brewer, FTIR, lidar, microwave, sondes, UV/Visible, or spectral UV), the proposal shall be evaluated by the corresponding NDACC Instrument Working Group. The recommendations from that Working Group will be presented to the Steering Committee for final action.
- 2) In the case where the measurement technique is different from that of the NDACC instruments, the appropriate Working Group(s), either established or ad hoc, shall evaluate the proposal and present their recommendations to the Steering Committee. If the proposed measurements are of species or parameters different from those addressed by NDACC, the appropriate Working Group(s) shall evaluate the benefit of such measurements to the NDACC, as well as the calibration procedures used by the investigators.
- 3) In the case where the proposed measurement will be conducted at an existing NDACC station, an evaluation by a committee consisting of NDACC PIs making measurements at that station also may be sought.
- 4) For cases not directly covered under items 1, 2, or 3 above, the NDACC Steering Committee shall decide on an appropriate evaluation procedure.

If the proposing investigator requires specific resources in support of the measurement activity, the investigator also should submit a proposal to an appropriate funding agency. In such cases, a 'point of contact' within the agency

should be identified in the proposal submitted to the NDACC Steering Committee so that the results of the NDACC evaluation can be communicated to the funding agency.

Framework for Collaboration

- 1) In all cases where the measurement quantity also is measured by other NDACC instruments, a strict 'double-blind' intercomparison should be conducted. This may be achieved using an independent method (e.g., sondes vs. lidar ozone observations), an existing record of intercomparison, or with NDACC mobile intercomparators.
- 2) During their data acquisition periods, all PIs shall have access to archived preliminary data, and will be bound by the Data Protocol for the submission of their own data. NDACC PIs are encouraged to collaborate actively with others to ensure their full participation in the analysis/verification process.
- 3) The NDACC Data Protocol regarding co-authorship and exchange of results provides the guidelines for collaborative projects.
- 4) A measurement investigator may propose an interaction with NDACC for a specified period of time (e.g., for a particular campaign), or for open-ended studies.